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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/476,633	12/31/1999	LI-SHUN WANG	042390.P7832	8091

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EXAMINER

GARCIA, JOANNIE A

ART UNIT PAPER NUMBER

2823

DATE MAILED: 04/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/476,633

Applicant(s)

WANG ET AL

Examiner

Joannie A Garcia

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4,6-11 and 13-28 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-4,6-11 and 13-28 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

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The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 26-28 are rejected under 35 U.S.C. 112, first paragraph, as containing subject Matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors), at the time the application was filed, had possession of the claimed invention. There is no description in the specification as originally filed of the use of hydrogen peroxide only. There is only seen support for hydrogen peroxide and nitric acid (Page 8, lines 1-2), and hydrogen peroxide and deionized water (Page 8, lines 15-19).

Claims 9-11, 15, 24, and 27, are rejected under 35 U.S.C. 102(e) as being anticipated by Kishii et al (U.S. Patent 6,159,858).

The rejection is maintained as stated in the Office Action mailed 6-20-01, and as stated below.

Applicant argues that claims 9, 24, and 27, particularly points out and distinctly claim the subject matter, which Applicant regards as the invention. However, Kishii et al particularly points out and distinctly claim the subject matter, which Applicant regards as the invention as recited in the Office Action mailed 06-20-01. Furthermore, Kishii et al discloses a method of removing at least one particle from a surface of a metal plug disposed over a substrate comprising depositing an abrasive silica slurry onto a W, Cu, or Al metal layer 44 over the metal plug 44b (Figures 11D and 11E, Table II, Column 10, lines 8-11, Column 11, lines 27, 37, and

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40, Column 13, lines 63-67, and Column 14, lines 5-9), CMP polishing the metal layer (Figure 11E, and Column 13, lines 63-67), and after polishing the metal layer, rinsing the surface of the metal plug with a hydrogen peroxide aqueous solution, wherein rinsing is spraying the solution over the surface of the metal plug to drive at least one particle off the surface of the metal plug (Column 4, lines 3-7, Column 9, lines 5-20, Column 14, lines 49-61).

Claims 13, 14, 16, and 17, are rejected under 35 U.S.C. 103(a) as being unpatentable over Kishii et al as applied to claims 9-11, 15, 24, and 27 above, and further in view of the following comment.

The rejection is maintained as stated in the Office Action mailed 6-20-01, and as stated below.

With regard to claims 13, 14, 16, and 17, it would be a matter of routine optimization to determine a suitable polishing pressure, removal rate, and percent by volume of hydrogen peroxide to achieve the polishing and the rinsing steps of Kishii et al.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4, 6-8, 18-23, 25, 26, and 28, are rejected under 35 U.S.C. 103(a) as being unpatentable over Oliver (U.S. Patent 5,876,271), in combination with Hada et al (U.S. Patent 5,911,836).

Oliver discloses a method of removing a particle from a surface of a metal plug comprising introducing an abrasive silica or alumina slurry onto a tungsten metal layer, polishing the tungsten metal layer with the slurry by using a chemical mechanical polishing process (Column 2, lines 55-57, Column 5, lines 10-12 and 15-20, and Column 10, lines 15-19), while polishing the tungsten metal layer, rinsing a surface of the metal plug with a second agent comprising water (Column 10, lines 15-19), wherein the second agent is introduced through a polisher or sprayed over the surface of the metal plug to drive at least one particle off the surface of the metal plug (Column 10, lines 15-19), and polishing a substrate with the second agent (Column 2, lines 48-53, and Column 4, lines 10-30).

Oliver discloses fast and controllable transitions between different slurry types and combinations of fluids (Column 7, lines 3-5), and that the type of slurry or liquid being delivered to the polishing pad surface can be changed quickly by simply switching to a different source lines, and as an example, a quick transition from polishing to rinsing with water can be accomplished in this manner (Column 10, lines 15-19). The composition of the bath between the polishing pad and the wafer would gradually change from pure slurry to pure rinsing solution after commencing addition of rinsing solution during which time polishing and rinsing would be occurring simultaneously.

Oliver discloses rinsing the surface of the tungsten metal plug using water (Column 5, lines 10-12, and Column 10, lines 15-19). Oliver does not teach rinsing the surface of the tungsten metal plug using hydrogen peroxide.

Hada et al discloses rinsing a surface of a tungsten metal film using water, hydrogen peroxide, and water and hydrogen peroxide (Column 3, lines 41-63, Column 4, lines 12-15, and

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Column 6, lines 24-28). It would have been within the scope of one of ordinary skill in the art to combine the teachings of the Oliver and Hada et al to enable the surface metal rinsing step of Oliver to be performed.

With regards to claims 6, 8, and 20-22, it would be a matter of routine optimization within the teachings of Oliver and Hada et al to determine a suitable polishing pressure, percent by volume of hydrogen peroxide, and metal removal rate, to achieve the polishing and the rinsing steps.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist whose telephone number is (703) 308-0956 until 2/4/04. See MPEP 203.08.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Joannie Adelle García whose telephone number is (571) 272-1861. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (571) 272-1855. The fax number for this group is 703-872-9306 for before final submissions, 703-872-9306 for after final submissions and the customer service number for group 2800 is (703) 872-9317. Updates can be found at <http://www.uspto.gov/web/info/2800.htm>.

JAG

April 7, 2004

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